Addendum # 4

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PROJECT NAME: SUU Old Main Building Renovation
Southern Utah University
Cedar City, Utah

DATE: September 15, 2004

DFCM Project No.: **003234730**
CRSA Project No.: **B04-012**

FROM: Cooper Roberts Simonsen Architects
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TO: All Bidders

This Addendum forms a part of the Contract Documents and modifies the original Bid Documents dated July 21, 2004 as noted below. Acknowledge receipt of this Addendum in the space provided on the Bid Form. Failure to do so may subject the Bidder to disqualification.
PLEASE NOTE THAT THE DRAWING AND SPECIFICATIONS TO BE USED IN BIDDING SHOULD BE THOSE DATED 8-27-04.

This Addendum consists of (0) 8 ½"x11" pages, (0) 8 ½"x11" specification pages, and (0) 8 ½"x11" drawing pages.

I. CHANGES TO PRIOR ADDENDA:

III-1 None

II. CHANGES TO BIDDING REQUIREMENTS:

II-1 None

IV. CHANGES TO AGREEMENT & OTHER CONTRACT FORMS:

III-1 None

IV. CHANGES TO CONDITIONS OF THE CONTRACT:

III-2 None

V. CHANGES TO SPECIFICATIONS:

V-1 01230 – Alternates

a) Repalce 3.1 C with the following: "Alternate No. 3: Replace all exterior windows with aluminum clad wood windows as defined in Specification Section 08551 – Aluminum Clad Wood Windows. Included in this alternate the staining of all of the exposed wood interior faces of the wood windows to match the wood stain color of the adjacent trim and base." With this alternate, the eight windows on the sides of the stair enclosures (North Stair and East Stair) are required to be fire rated.

This will require a hollow metal frame painted to match the aluminum with 90-minute fire glazing (not wire glass).

V-2 01310 – Project Management and Coordination

a) 1.5 D Progress Meetings

(1) Add "Scheduling Requirements:"

(a) At each weekly meeting a **4-week projection schedule** is to be prepared showing all work that is upcoming in the following four weeks. The schedule should also include information such as the status of materials to the site, critical dates for material ordering, and due dates for shop drawings.

(b) At each weekly meeting, along with the 4-week projection schedule a **critical path schedule** is to be prepared showing only the critical path items for the full duration of the project that is updated to reflect actual conditions.

V-3 01781 – Project Record Documents & 01782 – Operation and Maintenance Data

a) Along with a single printed version, the final draft of the record documents and all Operations and Maintenance data is to be submitted in a ".pdf", electronic format on a CD/DVD.

V-4 03371 – Shotcrete

a) Add this section to the Contract Documents. The specification section is attached at the end of this document.

V-5 06100 – Rough Carpentry

a) Add to 3.1 A. "Each wood stud that is part of a finish wall is to be checked for plumbness. The studs are to be within ¼" of true. Replace studs as necessary. The purpose is to guard against waves in long walls such as the lobbies and conference rooms".

V-6 06200 – Finish Carpentry

a) Add the following as 1.05 C. – "Quality Assurance:

Mockups: Manufacture and install one complete set of cabinets with all accessories and countertop to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

(1) Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

b)

V-7 07530 – Elastomeric Membrane Roofing

a) Add 2.01 A 6. GAF, EverGuard EDPM

V-8 07900 – Joint Sealers

a) Add the following as 1.07 – Quality Assurance:

Mockups: Before installing the joint sealers (that exposed to view), provide mockups that show the various conditions to receive sealants to demonstrate aesthetic effects and set quality standards for materials and execution.

(1) Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

V-9 08550 – Wood Windows

a) Clarification – This section applies to all base bid window work only.

b) 2.01 Manufacturers

(1) Remove A.

(2) Add to 2.01 B

(a) Acceptable Manufacturers

(i) Marvin

(ii) Pozzi

(iii) Pella

(iv) Sierra Pacific

V-10 08551 – Aluminum Clad Wood Windows

a) Clarification – This section applies to all exterior windows and doors for Alternate C only.

b) Add Section 08551 – Aluminum Clad Wood Windows to the specification. See Section 01230 Alternate "C" (as shown in this addendum) for scope of this work.

V-11 08710 – Door Hardware

a) 1.7 A 2 – Change to: "Warranty Period: Three years minimum or greater (based on manufacturers standard warranty period) from date of substantial completion, except as follows:".

b) 1.7 A 2 a. – Change "Two years" to "Three years".

c) Add to 2.3 C. 4. – Approved Manufacturer: McKinney Builders' Hardware.

d) Add to 2.5 B. 2. a. – Provide the Rhodes lever.

e) Add 2.5 B. 2. b. – Approved Manufacturer: Sargent 10 Line Cylindrical Lever Locks with L Lever Design. Provide manufacturers 7 year warranty.

f) Add to 2.7 H 1 – Approved Model: Sargent 80 Series Exit Device, Narrow design with ETL lever. Provide manufacturers 5 year warranty.

g) Add to 2.10 E 1 b. – Sargent 351 Series Powerglide Door Closer. Provide manufacturers 10 year warranty.

h) 3.8 Hardware Schedule

(1) Remove "by aluminum door manufacturer" from the hinges on hardware groups H3 – H9.

(2) Add Hardware Group H10 as follows:

H10 Attic Door

Hardware Function: F-75 with Lever

Hinges: 1.5 pair

Magnetic door seal on all four door sides to hollow metal frame

Wall or floor door stop as directed by Architect.

V-12 09260 – Gypsum Board Assemblies

a) Add the following as 1.5 C. –

Mockups: Before installing the finish gypsum board (that exposed to view), build a mockup in one room to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution. The mock up is to be fully tapped and primed.

1. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

V-13 09511 – Acoustical Panel Ceilings

a) Add the following as 1.5 C. –

Mockups: Provide a mockup in one room to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

V-14 09680 – Carpet

a) Add to 2.1 B 1 b. – Bentley Tanucci 8TU2806301 with integral cushion pad is an alternate that can be used for the General offices, halls, and ground floor conference rooms.

b) Add to 2.1 B 2 b. – Bentley Roseo 886485 with integral cushion pad is an alternate that can be used for the second and third floor conference rooms, Provost's office, President's office, and Vice Presidents office.

V-15 10101 – Visual Display Surfaces

a) Remove 2.4 B.

b) Add: 2.0 Reviewed and approved Manufacturers

(1) AARCO Products Inc.

(2) Newline Products, Inc. (NPI)

(3) Other manufacturers meeting requirements of the specifications.

V-16 15910 – Direct Digital Controls

a) Add the following Paragraph: 2.2.D. "Honeywell HBS shall be considered an equal provider on the HVAC controls system on the Southern Utah University Old Main Seismic upgrade and remodel. Honeywell may provide a quote in which all controls will tie to the existing Tridium Front end as currently specified or they may provide as an acceptable and equal quote, the upgrade of the existing XBSi front end to Enterprise Building Integrator (EBI). With the EBI approach, the existing Honeywell DDC controls on campus would report through the new EBI as would the new controls being installed in the Old Main project. The controls system for the Old Main project will still be required to meet or exceed all of the other requirements outlined in section 15910 of the original specifications."

V-17 Prior Mechanical Approvals

a) The following items, as submitted, are considered, in general and in name only, as equal to those items specified. This review does not relieve the contractor of the responsibility of conforming to the drawings and specifications for dimensions to be confirmed and correlated at the jobsite and for requirements of the specifications for coordination with other trades. The contractor shall be responsible for verifying existing conditions and the suitability of equal products for the specified application.

Description	Manufacturer
Base Mounted Pumps	Paco
Base Mounted Pumps	Peerless
Base Mounted Pumps	Flo-fab
In-line Pumps	Flo-fab
In-line Pumps	Peerless
In-line Pumps	Paco

In-line Pumps	Weinman
Pump suction diffusers	Weinman
Pump suction diffusers	Paco
Flexible connectors	Wheatley
Flexible connectors	Southeastern Hose
Submersible Sump	Hydromatic
Expansion Tank	Weinman
Expansion Tank	Weben Jarco
Expansion Tank	Flo-fab
High capacity air vent	Wheatley
High capacity air vent	Spirotherm
Air separator	Flo-fab
Air separator	Wheatley
Air separator	Weinman
Direct Buried Pipe	Urecon
Check Valves and Strainers	Mueller
Balancing Valves	Gerand
Balancing Valves	Danfoss
Balancing Valves	Griswold
Hydronic Specialties	Flo-fab
Pressure Gauges	Miljoco
Thermometers	Miljoco
Condensate receiver/pump	Paco
Condensate receiver/pump	Mepco
Condensate receiver/pump	Sterling
Steam traps and specialties	Mepco
Drainage products and plumbing specialties	Watts Drainage Products
Faucets	Chicago
Traps and Supplies	EBC
Shower Trim	Symmons
Plumbing Fixtures	Crane
Plumbing Fixtures	Briggs/Sayco/ProFlo
Service Sink	Ceco
Electric Water Heater	Rheem
Electric Water Heater	Lochinvar
Steam to Hot Water Convertor	Wheatley
Steam to Hot Water Convertor	Flo-fab
Computer Room AC Unit	Compu-Aire
Computer Room AC Unit	APC
HETD	Air-rite
HETD	Clifco
Volume Dampers	Air-rite
Fire Dampers	Cesco
Fire Dampers	Greenheck
Fire Dampers	C&S by PCI
Exhaust Fans	ACME
Exhaust Fans	Greenheck
Exhaust Fans	Twin City

Diffusers, Registers, and Grilles	Titus
Louvers	Cesco
VAV Boxes	Carnes
VAV Boxes	Krueger
VAV Boxes	Nailor
VAV Boxes	Titus
VAV Boxes	Metal-Aire

VI. CHANGES TO DRAWINGS:

VI-1 SF504 – Framing Details
- a) Detail A2/SF504 – Existing masonry wall shall be moved inward so that the interior face of the masonry wall is flush with the steel tube.

VI-2 AD101 – Demo Plans
- a) Add the following to Note 23, "Remove all vines encountered during the removal of the brick. Patch and fill all voids found in masonry wall".

VI-3 AD102 – Attic & Roof Demo Plan
- a) Note 1 – Change "wood truss" to "wood framing"

VI-4 AE101 – Floor Plans
- a) Add Room Name "Attic Access 324" to the small closet on the north side of East Stair A/301.
- b) Add Door Type Note 324/A to the Door to Attic Access 324.

VI-5 AE402-AE404 – Interior Elevations
- a) Change Note 19 to read "Wall mounted Visual Display Conference Unit. See Specification Section 10101".

VI-6 AE502 – Typical Details
- a) Detail C5 – Change Simpson "Free" mount hanger to Simpson "Face" mount hanger.

VI-7 AE601 – Door Schedule & Door Types
- a) Add door 324A – Attic Access with the following components
  - (1) Door: Single
  - (2) Door Type: 2
  - (3) Frame Type: A
  - (4) Hardware Group: H10
  - (5) Fire Rating: 90
  - (6) Threshold: T1
- b) For "All Attic Doors" Change the Hardware Group to H10.
- c) Window Types
  - (1) Window Type 'C' & 'D'
    - (a) Remove "New Tempered Insulation Glazing"
    - (b) The still guards are required for both window types.

End of Addendum

SECTION 03371

SHOTCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes shotcrete applied by the dry-mix or wet-mix process.

1.3 DEFINITIONS

A. Shotcrete: Mortar or concrete pneumatically projected onto a surface at high velocity.

B. Dry-Mix Shotcrete: Shotcrete with most of the water added at nozzle.

C. Wet-Mix Shotcrete: Shotcrete with ingredients, including mixing water, mixed before introduction into delivery hose.

1.4 SUBMITTALS

A. Product Data: For manufactured materials and products including reinforcement and forming accessories, shotcrete materials, admixtures, and curing compounds.

B. Shop Drawings: For details of fabricating, bending, and placing reinforcement. Include support and anchor details, number and location of splices, and special reinforcement required for openings through shotcrete structures.

C. Design Mixes: For each shotcrete mix.

D. Material Test Reports: For shotcrete materials.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer employing nozzle operators who attain mean core grades not exceeding 2.5, according to ACI 506.2, on preconstruction tests.

B. Comply with provisions of the following, unless more stringent requirements are indicated:

1. ACI 301, "Specification for Structural Concrete."
2. ACI 506.2, "Specification for Shotcrete."
3. CRSI's "Manual of Standard Practice."

C. Preconstruction Testing Service: Owner will engage a qualified independent testing agency to perform preconstruction testing and inspections indicated below:

1. Produce test panels before shotcrete placement according to requirements in ACI 506.2 and ASTM C 1140 for each design mix, shooting orientation, and nozzle operator. Produce test panels with dimensions of 24 by 24 inches (600 by 600 mm) minimum and of average thickness of shotcrete, but not less than 3-1/2 inches (90 mm). From each test panel, testing agency will obtain six test specimens: one set of three specimens unreinforced and one set of three specimens reinforced. Agency will perform the following:

   a. Test each set of unreinforced specimens for compressive strength according to ASTM C 42.
   b. Visually inspect each set of reinforced shotcrete cores taken from test panels and determine mean core grades according to ACI 506.2.

D. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

E. The Shotcrete walls are to be level and true. The inside face of the walls should be flush with the inside face of the masonry. If the required shear wall depth cannot be achieved without protruding past the face of the existing masonry, notify the architect before installation of the Shotcrete wall.

1.6 PROJECT CONDITIONS

A. Cold-Weather Shotcreting: Protect shotcrete work from physical damage or reduced strength caused by frost, freezing, or low temperatures according to ACI 306.1 and as follows:

1. Discontinue shotcreting when ambient temperature is 40 deg F (4.4 deg C) and falling. Uniformly heat water and aggregates before mixing to obtain a shotcrete shooting temperature of not less than 50 deg F (10 deg C) and not more than 90 deg F (32 deg C).
2. Do not use frozen materials or materials containing ice or snow.
3. Do not place shotcrete on frozen surfaces or surfaces containing frozen materials.
4. Do not use calcium chloride, salt, and other materials containing antifreeze agents.

B. Hot-Weather Shotcreting: Mix, place, and protect shotcrete according to ACI 305R when hot-weather conditions and high temperatures would seriously impair quality and strength of shotcrete, and as follows:

1. Cool ingredients before mixing to maintain shotcrete temperature at time of placement below 100 deg F (38 deg C) for dry mix or 90 deg F (32 deg C) for wet mix.
2. Decrease temperature of reinforcing steel and receiving surfaces below 100 deg F (38 deg C) before shotcreting.

PART 2 - PRODUCTS

2.1 FORM MATERIALS

A. Forms: Form-facing panels that will provide continuous, straight, smooth, concrete surfaces. Furnish panels in largest practicable sizes to minimize number of joints.

2.2 REINFORCING MATERIALS

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.

B. Plain-Steel Wire: ASTM A 82.

C. Supports: Bolsters, chairs, spacers, ties, and other devices for spacing, supporting, and fastening reinforcing steel in place according to CRSI's "Manual of Standard Practice" and as follows:

D. Epoxy Anchors: ASTM F 1554, threaded rods; carbon steel; double nuts; and standard washer.

1. Finish: Plain, uncoated.

2. Epoxy Material:
   a. "Epcon Injection System"(Ceramic 6 Epoxy); ITW Ramset/ Red Head, Wood Dale, Ill.
   b. "Chem-Fast Acrylic Epoxy Injection System"; Rawlplug Co., New Rochelle, N.Y.

2.3 SHOTCRETE MATERIALS

A. Portland Cement: ASTM C 150, Type III. Use only one brand and type of cement for Project.

1. Fly Ash: ASTM C 618, Class F.

B. Normal-Weight Aggregates: ASTM C 33, from a single source, and as follows:

1. Aggregate Gradation: ACI 506R, Gradation **No. 2 with 100 percent passing 1/2-inch (13-mm)** sieve.

C. Water: Potable, complying with ASTM C 94, free from deleterious materials that may affect color stability, setting, or strength of shotcrete.

2.4 CHEMICAL ADMIXTURES

A. General: ASTM C 1141, Class A or B, but limited to the following admixture materials. Provide admixtures for **dry-mix or wet-mix** shotcrete that contains not more than 0.1 percent chloride ions. Certify compatibility of admixtures with each other and with other cementitious materials.

1. Air-Entraining Admixture: ASTM C 260.
2. Water-Reducing Admixture: ASTM C 494, Type A.
3. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.

2.5 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) dry.

B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

C. Water: Potable.

D. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.

2.6 SHOTCRETE MIXES, GENERAL

A. Prepare design mixes for each type and strength of shotcrete.

1. Limit use of fly ash to not exceed, in combination, 15 percent of portland cement by weight.

B. Limit water-soluble chloride ions to maximum percentage by weight of cement or cementitious materials permitted by ACI 301.

C. Admixtures: When included in shotcrete design mixes, use admixtures and retarding admixtures according to manufacturer's written instructions.

D. Design-Mix Adjustments: Subject to compliance with requirements, shotcrete design-mix adjustments may be proposed when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant.

2.7 NORMAL-WEIGHT SHOTCRETE MIXES

A. Proportion dry mixes by field test data methods and wet mixes according to ACI 211.1 and ACI 301, using materials to be used on Project, to provide normal-weight shotcrete with the following properties:

1. Compressive Strength (28 Days): 4000 psi (27.6 MPa).

2.8 SHOTCRETE EQUIPMENT

A. Mixing Equipment: Capable of thoroughly mixing shotcrete materials in sufficient quantities to maintain continuous placement.

B. Dry-Mix Delivery Equipment: Capable of discharging aggregate-cement mixture into delivery hose under close control and maintaining continuous stream of uniformly mixed materials at required velocity to discharge nozzle. Equip discharge nozzle with manually operated water-injection system for directing even distribution of water to aggregate-cement mixture.

1. Provide uniform, steady supply of clean, compressed air to maintain constant nozzle velocity while simultaneously operating blow pipe for cleaning away rebound.
2. Provide water supply with uniform pressure at discharge nozzle to ensure uniform mixing with aggregate-cement mix. Provide water pump to system if line water pressure is inadequate.

C. Wet-Mix Delivery Equipment: Capable of discharging aggregate-cement-water mixture accurately, uniformly, and continuously.

2.9 BATCHING AND MIXING

A. Dry-Mix Process: Measure mix proportions by weight batching according to ASTM C 94 or by volume batching complying with ASTM C 685 requirements.

1. In volume batching, adjust fine-aggregate volume for bulking. Test fine-aggregate moisture content at least once daily to determine extent of bulking.
2. Prepackaged shotcrete materials may be used at Contractor's option. Predampen prepackaged shotcrete materials and mix before use.

B. Wet-Mix Process: Measure, batch, mix, and deliver shotcrete according to ASTM C 94 and furnish batch ticket information.

1. Comply with ASTM C 685 when shotcrete ingredients are delivered dry and proportioned and mixed on-site.

PART 3 - EXECUTION

3.1 PREPARATION

A. Concrete or Masonry: Before applying shotcrete, remove unsound or loose materials and contaminants that may inhibit shotcrete bonding. Chip or scarify areas to be repaired to extent necessary to provide sound substrate. Cut edges square and 1/2 inch (13 mm) deep at perimeter of work, tapering remaining shoulder at 1:1 slope into cavity to eliminate square shoulders. Dampen surfaces before shotcreting.

1. Abrasive blast or hydroblast existing surfaces that do not require chipping to remove paint, oil, grease, or other contaminants and to provide roughened surface for proper shotcrete bonding.

B. Earth: Compact and trim to line and grade before placing shotcrete. Do not place shotcrete on frozen surfaces. Dampen surfaces before shotcreting.

C. Rock: Clean rock surfaces of loose materials, mud, and other foreign matter that might weaken shotcrete bonding.

D. Steel: Clean steel surfaces by abrasive blasting according to SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."

3.2 FORMS

A. General: Design, erect, support, brace, and maintain forms, according to ACI 301, to support shotcrete and construction loads and to facilitate shotcreting. Construct forms so shotcrete members and structures are secured to prevent excessive vibration or deflection during shotcreting.

1. Fabricate forms to be readily removable without impact, shock, or damage to shotcrete surfaces and adjacent materials.
2. Construct forms to required sizes, shapes, lines, and dimensions using ground wires and depth gages to obtain accurate alignment, location, and grades in finished structures. Construct forms to prevent mortar leakage but permit escape of air and rebound during shotcreting. Provide for openings, offsets, blocking, screeds, anchorages, inserts, and other features required in the Work.

B. Form openings, chases, recesses, bulkheads, keyways, and screeds in formwork. Determine sizes and locations from trades providing such items. Accurately place and securely support items built into forms.

C. Form entire area in front of window as required to protect window, frame, and sill from damage or staining. Repair/replace all windows, frames, and sills damaged during shotcrete operations as required to match existing.

3.3 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other materials that weaken shotcrete bonding.

C. Securely embed reinforcing anchors into existing substrates, located as required.

D. Accurately position, support, and rigidly secure reinforcement against displacement by formwork, construction, or shotcreting. Locate and support reinforcement by metal chairs, runners, bolsters, spacers, and hangers, as required.

E. Place reinforcement to obtain minimum coverages for shotcrete protection. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during shotcreting. Set wire ties with ends directed into shotcrete, not toward exposed shotcrete surfaces.

F. Install welded wire fabric in lengths as long as practicable. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

3.4 JOINTS

A. Construction Joints: Locate and install construction joints tapered to a 1:1 slope where joint is not subject to compression loads and square where joint is perpendicular to main reinforcement. Continue reinforcement through construction joints, unless otherwise indicated.

B. Contraction Joints: Construct contraction joints in shotcrete using saw cuts 1/8-inch-(3-mm-) wide-by-1/3 slab depth or premolded plastic, hardboard, or fiberboard strip inserts 1/4-inch- (6-mm-) wide-by-1/3 shotcrete depth, unless otherwise indicated.

1. After shotcrete has cured, remove strip inserts and clean groove of loose debris.
2. Space joints at 10 feet (3.0 m) o.c. maximum horizontally and vertically and as approved by Architect.
3. Tool edges round on each side of strip inserts if floated or troweled finishes are required.

3.5 ALIGNMENT CONTROL

A. Ground Wires: Install ground wires to establish thickness and planes of shotcrete surfaces. Install ground wires at corners and offsets not established by forms. Pull ground wires taut and position adjustment devices to permit additional tightening.

3.6 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by shotcrete. Use Setting Drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

3.7 APPLICATION

A. Apply temporary protective coverings and protect adjacent surfaces against deposit of rebound and overspray or impact from nozzle stream.

B. Moisten wood forms immediately before placing shotcrete where form coatings are not used.

C. Apply shotcrete according to ACI 506.2.

D. Apply dry-mix shotcrete materials within 45 minutes after predampening and wet-mix shotcrete materials within 90 minutes after batching.

E. Deposit shotcrete continuously in multiple passes, to required thickness, without cold joints and laminations developing. Place shotcrete with nozzle held perpendicular to receiving surface. Begin shotcreting in corners and recesses.

1. Remove and dispose of rebound and overspray materials during shotcreting to maintain clean surfaces and to prevent rebound entrapment.

F. Maintain reinforcement in position during shotcreting. Place shotcrete to completely encase reinforcement and other embedded items. Maintain steel reinforcement free of overspray and prevent build-up against front face during shotcreting.

G. Do not place subsequent lifts until previous lift of shotcrete is capable of supporting new shotcrete.

H. Do not permit shotcrete to sag, slough, or dislodge.

I. Remove hardened overspray, rebound, and laitance from shotcrete surfaces to receive additional layers of shotcrete; dampen surfaces before shotcreting.

J. Do not disturb shotcrete surfaces before beginning finishing operations.

K. Remove ground wires or other alignment control devices after shotcrete placement.

L. Shotcrete Core Grade: Apply shotcrete to achieve mean core grades not exceeding 2.5 according to ACI 506.2, with no single core grade exceeding 3.0.

M. Installation Tolerances: Place shotcrete without exceeding installation tolerances permitted by ACI 117R, increased by a factor of 2.

3.8 SURFACE FINISHES

A. Broom Finish: Rough-textured finish obtained by screeding exposed face of shotcrete to required plane by rod, cutting screed, or trowel, and brooming after initial set.

3.9 CURING

A. Protect freshly placed shotcrete from premature drying and excessive cold or hot temperatures.

B. Start initial curing as soon as free water has disappeared from shotcrete surface after placing and finishing.

C. Curing Exposed Surfaces: Cure shotcrete by the following methods:

1. Moisture Curing: Keep surfaces continuously moist for at least seven days with water, continuous water-fog spray, water-saturated absorptive covers, or moisture-retaining covers. Lap and seal sides and ends of covers.
2. Curing Compound: Apply curing compound uniformly in continuous operation by power spray according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

    a. Apply curing compound to natural- or gun-finished shotcrete at rate of 1 gal./100 sq. ft. (1 L/2.5 sq. m).

D. Curing Formed Surfaces: Cure formed shotcrete surfaces by moist curing with forms in place for full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.

3.10 FORM REMOVAL

A. Forms not supporting weight of shotcrete may be removed after curing at not less than 50 deg F (10 deg C) for 24 consecutive hours after gunning, provided shotcrete is hard enough not to be damaged by form-removal operations and provided curing and protecting operations are maintained.

1. Leave forms supporting weight of shotcrete in place until shotcrete has attained design compressive strength. Determine compressive strength of in-place shotcrete by testing representative field-cured specimens of shotcrete.
2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.

B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing materials are unacceptable for exposed surfaces. Apply new form-coating compound as specified for new formwork.

3.11 FIELD QUALITY CONTROL

A. Owner will engage a qualified independent testing agency to sample materials, visually grade cores, perform tests, and submit reports during shotcreting.

B. Air Content: ASTM C 173, volumetric method or ASTM C 231, pressure method; 1 test for each compressive-strength test for each mix of air-entrained, wet-mix shotcrete measured before pumping.

C. Shotcrete Temperature: ASTM C 1064; 1 test hourly when air temperature is 40 deg F (4.4 deg C) and below and when 80 deg F (27 deg C) and above, and 1 test for each set of compressive-strength specimens.

D. Test Panels: Make a test panel, reinforced as in structure, for each shotcrete mix and for each workday or for every 50 cu. yd. (38 cu. m) of shotcrete placed, whichever is less. Produce test panels with dimensions of 24 by 24 inches (600 by 600 mm) minimum and of average thickness of shotcrete, but not less than 4-1/2 inches (115 mm). From each test panel, testing agency will obtain six test specimens: one set of three specimens unreinforced and one set of three specimens reinforced.

1. Test each set of unreinforced specimens for compressive strength according to ASTM C 1140 and construction testing requirements in ACI 506.2.
2. Visually inspect each set of reinforced shotcrete cores taken from test panels and determine mean core grades according to ACI 506.2.

E. In-Place Shotcrete: Take a set of 3 unreinforced cores for each mix and for each workday or for every 50 cu. yd. (38 cu. m) of shotcrete placed, whichever is less. Test cores for compressive strength according to ACI 506.2 and ASTM C 42. Do not cut steel reinforcement.

F. Strength of shotcrete will be considered satisfactory when mean compressive strength of each set of 3 unreinforced cores equals or exceeds 85 percent of specified compressive strength, with no individual core less than 75 percent of specified compressive strength.

1. Mean compressive strength of each set of 3 unreinforced cubes shall equal or exceed design compressive strength with no individual cube less than 88 percent of specified compressive strength.

3.12 REPAIRS

A. Remove and replace shotcrete that is delaminated or exhibits laminations, voids, or sand/rock pockets exceeding limits for specified core grade of shotcrete.

1. Remove unsound or loose materials and contaminants that may inhibit bond of shotcrete repairs. Chip or scarify areas to be repaired to extent necessary to provide sound substrate. Cut edges square and 1/2 inch (13 mm) deep at perimeter of work, tapering remaining shoulder at 1:1 slope into cavity to eliminate square shoulders. Dampen surfaces and apply new shotcrete.

B. Repair core holes from in-place testing according to repair provisions in ACI 301 and match adjacent finish, texture, and color.

3.13 CLEANING

A. Remove and dispose of rebound and overspray materials from final shotcrete surfaces and areas not intended for shotcrete placement.

END OF SECTION 03371

SECTION 08551 – ALUMINUM CLAD WOOD WINDOWS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following aluminum-clad wood-framed window product types:
   1. Fixed windows.
   2. Outswing doors.

B. Related Sections include the following:

   1. Division 8 Section "Glazing" for glazing of interior windows.

1.3 DEFINITIONS

A. C: Commercial.

B. Performance grade number, included as part of the AAMA/NWWDA product designation code, is actual design pressure in pounds force per square foot used to determine structural test pressure and water test pressure.

C. Structural test pressure, for uniform load structural test, is equivalent to 150 percent of design pressure.

D. Minimum test size is smallest size permitted for performance class (gateway test size). Products must be tested at minimum test size or at a size larger than minimum test size to comply with requirements for performance class.

1.4 PERFORMANCE REQUIREMENTS

A. General: Provide wood windows capable of complying with performance requirements indicated, based on testing manufacturer's windows that are representative of those specified and that are of test size indicated below:

   1. Minimum size required by AAMA/NWWDA 101/I.S.2.
   2. Minimum size required by gateway performance requirements for determining compliance with AAMA/NWWDA 101/I.S.2 for both gateway performance requirements and optional performance grades.
   3. Size indicated.

B. AAMA/NWWDA Performance Requirements: Provide wood windows of the performance class and grade indicated that comply with AAMA/NWWDA 101/I.S.2.

   1. Performance Class: C.

2. Performance Grade: Minimum for performance class indicated.

C. Thermal Transmittance: Provide wood windows with a whole-window U-value maximum indicated at 15-mph exterior wind velocity and winter condition temperatures when tested according to NFRC 100.

1. U-Value: .38 Btu/sq. ft. x h x deg F.

D. Solar Heat-Gain Coefficient: Provide wood windows with a whole-window SHGC maximum of .32, determined according to NFRC 200 procedures.

1.5 SUBMITTALS

A. Product Data: Include construction details, material descriptions, fabrication methods, dimensions of individual components and profiles, hardware, finishes, and operating instructions for each type of wood window indicated.

B. Shop Drawings: Include plans, elevations, sections, details, hardware, attachments to other Work, operational clearances, and the following:

1. Flashing and drainage details.
2. Glazing details.

C. Maintenance Data: For operable window sash, operating hardware, weather stripping, and finishes to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, with the experience and capability to conduct the testing indicated, as documented according to ASTM E 548.

B. Source Limitations: Obtain wood windows through one source from a single manufacturer.

C. Product Options: Drawings indicate size, profiles, and dimensional requirements of wood windows and are based on the specific system indicated. Refer to Division 1 Section "Product Requirements."

1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

D. Fenestration Standard: Comply with AAMA/NWWDA 101/I.S.2, "Voluntary Specifications for Aluminum, Vinyl (PVC) and Wood Windows and Glass Doors," for minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.

E. Glazing Publications: Comply with published recommendations of glass manufacturers and GANA's "Glazing Manual" unless more stringent requirements are indicated.

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify wood window openings by field measurements before fabrication and indicate measurements on Shop Drawings.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish opening dimensions and proceed with fabricating wood windows without field measurements. Coordinate wall construction to ensure that actual opening dimensions correspond to established dimensions.

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace wood windows that fail in materials or workmanship within specified warranty period. Failures include, but are not limited to, the following:

1. Failure to meet performance requirements.
2. Structural failures including excessive deflection.
3. Water leakage, air infiltration, or condensation.
4. Faulty operation of movable sash and hardware.
5. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
6. Insulating glass failure.

B. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Aluminum-Clad Wood Windows:

a. Fixed Windows:

1) Pella Corporation.
2) Pozzi Wood Windows; Jeld-Wen, Inc.

2. Aluminum Clad Wood Outswing Doors:
a. Pella Corporation.
b. Pozzi Wood Windows; Jeld-Wen, Inc.

2.2 MATERIALS, GENERAL

A. Wood: Clear western pine or another suitable fine-grained lumber; kiln-dried to a moisture content of 6 to 12 percent at time of fabrication; free of visible finger joints, blue stain, knots, pitch pockets, and surface checks larger than 1/32 inch deep by 2 inches wide; water-repellent preservative treated in accordance with WDMA I.S. 4.

B. Aluminum Extrusions and Rolled Aluminum for Cladding: Manufacturer's standard formed sheet or extruded-aluminum cladding, mechanically bonded to exterior exposed wood members. Provide aluminum alloy and temper recommended by wood window manufacturer

for strength, corrosion resistance, and application of required finish, but not less than 22,000-psi ultimate tensile strength, and not less than 16,000-psi minimum yield strength.

1. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
2. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
3. High-Performance Organic Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

    a. Fluoropolymer Two-Coat System: Manufacturer's standard two-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; to meet or exceed AAMA 2605. No substitutions.

        1) Color and Gloss:
            a) Window Frames: "Putty" (or match) by Pozzi.
            b) Window Sashes: "Brick Red" (or match) by Pozzi.

C. Wood Trim and Glazing Stops: Material and finish to match frame members.

D. Interior Finish: Unfinished clear Western Pine, ready for site finishing.

E. Fasteners: Aluminum, nonmagnetic stainless steel, epoxy adhesive, or other materials warranted by manufacturer to be noncorrosive and compatible with wood window members, cladding, trim, hardware, anchors, and other components.

1. Exposed Fasteners: Unless unavoidable for applying hardware, do not use exposed fasteners. For application of hardware, use fasteners that match finish of member or hardware being fastened, as appropriate.

F. Anchors, Clips, and Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated.

G. Reinforcing Members: Aluminum, nonmagnetic stainless steel, nickel/chrome-plated steel complying with ASTM B 456 for Type SC 3 severe service conditions, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated.

H. Compression-Type Weather Stripping: Provide compressible weather stripping designed for permanently resilient sealing under bumper or wiper action, and completely concealed when wood window is closed.

1. Weather-Stripping Material: Dual weatherstripping. Foam lined bulb seal compressed between the interior of the sash and frame in a continuous plane on all four sides. Secondary leaf seal compressed between the edge of the sash and frame.

I. Replaceable Weather Seals: Comply with AAMA 701/702.

J. Provide aluminum brick mold for all exterior windows.

2.3 GLAZING

A. Window Glass: Sealed insulating glass units constructed of one pane of clear float glass and one pane of Low-E coated float glass units complying with Division 8 Section "Glazing." See window schedule for locations for required tempered glazing.
   1. Use UltraEdge continuous roll formed steel spacer or equal, with polyurethane sealant and include stainless steel capillary breather tube to equalize environmental stress.
   2. Insulated Unit Width: 3/4".

B. Window Glazing System: Glass shall be mounted to sash frame utilizing a silicone glazing compound and secured with profiled wood stops on the interior of the sash.

C. Door Glazing: Sealed insulating glass shall be constructed of one pane of tempered clear float glass and one pane of tempered Low-E coated float glass utilizing UltraEdge continuous roll formed steel spacer with polyurethane sealant, and including a .032" OD x .020" ID x 12" stainless steel capillary breather tube to equalize environmental stress. Overall insulated unit width is 3/4" with a ½" captive air space. Glass shall be mounted to sash frame utilizing a silicone glazing compound and secured with profiled wood stops on the interior of the panel.

2.4 WINDOW FABRICATION

A. General: Fabricate wood windows, in sizes indicated, that comply with AAMA/NWWDA 101/I.S.2 for performance class and performance grade indicated. Include a complete system for assembling components and anchoring windows.
   1. Corner joints mortised and tenoned.

B. Fabricate wood windows that are reglazable without dismantling sash or ventilator framing.

C. Weather Stripping: Provide full-perimeter weather stripping for each operable sash and ventilator, unless otherwise indicated.

D. Factory machine windows for openings and hardware that is not surface applied.

E. Mullions: Provide mullions and cover plates as shown, matching window units, complete with anchors for support to structure and installation of window units. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections, as indicated. Provide mullions and cover plates capable of withstanding design loads of window units.

F. Factory-Glazed Fabrication: Except for light sizes in excess of 100 united inches, glaze wood windows in the factory where practical and possible for applications indicated. Comply with requirements in Division 8 Section "Glazing" and with AAMA/NWWDA 101/I.S.2.

   1. Groove Glazing: Factory-glazed units without removable stops or other provision permitting convenient field disassembly to facilitate replacement of broken glass will not be accepted.

G. Glazing Stops: Provide nailed or snap-on glazing stops coordinated with Division 8 Section "Glazing" and glazing system indicated. Provide glazing stops to match sash and ventilator frames.

H. Complete fabrication, assembly, finishing, hardware application, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation. Allow for scribing, trimming, and fitting at Project site.

2.5 OUTSWING DOORS

A. Frame: Select kiln dried Western Pine, water-repellent, preservative-treated in accordance with WDMA I.S. 4.; exterior surfaces extruded aluminum. Overall frame depth 4-9/16".

B. Panels: Select kiln dried Western Pine, water-repellent, preservative treated in accordance with WDMA I.S.4; interior exposed surfaces clear Western Pine. Exterior surfaces clad with .024" roll formed aluminum. Top rails shall be solid Western Pine veneer laminated to a kiln dried edge-and-end glued core. Stiles shall be solid Western Pine veneer laminated to a Timberstrand core. Bottom rails shall be solid Western Pine veneer laminated to a kiln dried edge-and-end glued core. Stiles and rails are 1-23/32" thick. Stiles are 6-5/8", top rail is 6-5/8" and bottom rail is 10-1/4" wide.

C. Sill: Extruded aluminum handicap sill shall be 1/2" high to meet standards set forth by ADA for handicap access. Doorshoe/kickplate with integral sweep shall be applied to panel.

D. Weatherstripping: Dual weatherstripping. Foam-filled vinyl wrapped full perimeter on the head and side jambs. Pemco 2 piece adjustable sweep astragal to be applied to each panel on double doors.

E. Door panels shall be mounted utilizing steel based, brushed chrome ball bearing NRP hinges. Doors shall not be bored for hardware.

F. Interior Finish: Unfinished clear Western Pine, ready for site finishing.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances; rough opening dimensions; levelness of sill plate; coordination with wall flashings, vapor retarders, and other built-in components; and other conditions affecting performance of work.

1. Masonry Surfaces: Visibly dry and free of excess mortar, sand, and other construction debris.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Comply with manufacturer's written instructions for installing windows, hardware, accessories, and other components; Drawings; and Shop Drawings.

B. Install windows level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction.

C. Set sill members in bed of sealant or with gaskets, as indicated, for weathertight construction.

D. Metal Protection: Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials by complying with requirements specified in "Dissimilar Materials" Paragraph in Appendix B in AAMA/NWWDA 101/I.S.2.

3.3 ADJUSTING

A. Adjust operating sashes and ventilators, screens, hardware, and accessories for a tight fit at contact points and weather stripping for smooth operation and weathertight closure. Lubricate hardware and moving parts.

3.4 PROTECTION AND CLEANING

A. Protect window surfaces from contact with contaminating substances resulting from construction operations. In addition, monitor window surfaces adjacent to and below exterior concrete and masonry surfaces during construction for presence of dirt, scum, alkaline deposits, stains, or other contaminants. If contaminating substances do contact window surfaces, remove contaminants immediately according to manufacturer's written recommendations.

B. Clean exposed surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.

C. Clean factory-glazed glass immediately after installing windows. Comply with manufacturer's written recommendations for final cleaning and maintenance. Remove nonpermanent labels and clean surfaces.

D. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

END OF SECTION 08551